Dynamic Routing

1. RIP v1 & v2

"RIP, or Routing Information Protocol, is a dynamic routing protocol used in IP networks. RIP version 1 (RIPv1) is a classful routing protocol—which means it does not include subnet mask information in its updates, only supports default subnet masks, and uses broadcast to share routing information. This leads to limitations with subnetting and scalability.

RIP version 2 (RIPv2), on the other hand, is an enhanced version. It is classless, meaning it includes subnet mask details in updates, and supports VLSM and CIDR, making it better for modern networks. RIPv2 also uses multicast for routing updates, which is more efficient, and adds authentication features to enhance security. Because of these improvements, RIPv2 is more commonly used today.

RIP Version 1 and Version 2: Comparison

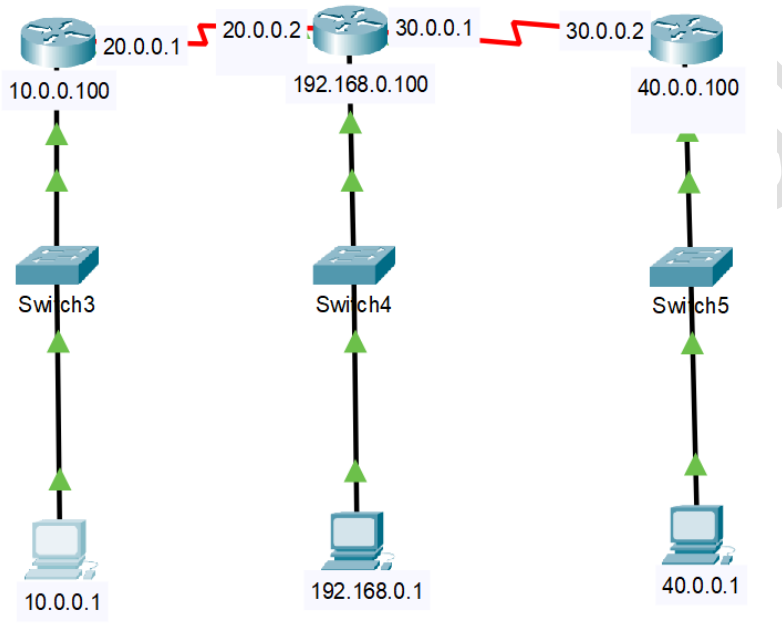
Feature	RIP Version 1	RIP Version 2
Routing Type	Classful	Classless (supports VLSM/CIDR)
IP Mask Support	No mask in updates	Subnet mask included in updates
Addressing Updates	Broadcast (255.255.255.255)	Multicast (224.0.0.9)
Authentication	No	Yes, supports authentication
Metric	Hop count (max 15)	Hop count (max 15)
Usage	Simple, small networks	Suitable for modern scalability
Security	Less secure	More secure

Key Concepts and Configuration

- **Classful Routing (RIP v1):** Only understands major networks, ignores subnet information, and always assumes default subnet masks (e.g., 8 for Class A, 16 for Class B, 24 for Class C).
- **Classless Routing (RIP v2):** Includes subnet mask info in routing updates, enabling VLSM and CIDR, essential for modern IP planning.

- **Updates:** RIP v1 uses broadcast packets, which all nodes receive, even those not participating in routing. RIP v2 uses multicast, reducing unnecessary load and traffic.
- **Authentication:** Only available in RIP v2, supporting plaintext and MD5, valuable for secure environments.[1][2][3]

Topology and IP Assignment



Device/Interface	IP Address	Notes
PC 1	10.0.0.1	Connected to Router0 (gateway 10.0.0.100)
PC 2	192.168.0.1	Connected to Router1 (gateway 192.168.0.100)
PC 3	40.0.0.1	Connected to Router2 (gateway 40.0.0.100)
Router0 f0/0	10.0.0.100	Default gateway for PC 1
Router1 f0/0	192.168.0.100	Default gateway for PC 2
Router2 f0/0	40.0.0.100	Default gateway for PC 3
R0 Serial s2/0	20.0.0.1	To R1 Serial s2/0
R1 Serial s2/0	20.0.0.2	To R0
R1 Serial s3/0	30.0.0.1	To R2 Serial s3/0
R2 Serial s3/0	30.0.0.2	To R1

Example RIP v1 Configuration

On Router 0:

```
router rip
version 1
network 10.0.0.0
network 20.0.0.0
```

On Router 1:

```
router rip
version 1
network 20.0.0.0
network 192.168.0.0
network 30.0.0.0
```

On Router 2:

```
router rip
version 1
network 30.0.0.0
network 40.0.0.0
```

- With these settings, each router advertises the connected networks and enables dynamic routing for your PCs to ping each other, illustrating RIPv1 operations.[4][5]

Testing the Setup

- After configuring RIP (v1), all routes are shared among routers, so each PC can reach any other PC in the network if proper cabling/interfaces are up and IPs are correct.
- Use ping on any PC to test connectivity to other PC IP addresses.
- This lab illustrates both the simplicity of RIP v1 and its limitations (no VLSM, less security). RIP v2 is preferred in networks needing subnetting control or better security.[2][5][1][4]

Summary: RIP v1 is simple and broadcasts classful updates, fitting for legacy/small labs like your scenario. RIP v2 is modern, supports subnet masks, multicast updates, and authentication, making it better suited for most real-world networks today.